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Biopsychosocial factors related to emotional disorders among adolescents

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Abstract

Background: Adolescence is a critical developmental period marked by biological, psychological, and social changes that increase vulnerability to mental-emotional disorders. Mental-emotional disorders among adolescents may impair academic performance, social relationships, and overall well-being. In Indonesia, particularly at the regional level, evidence regarding comprehensive biopsychosocial determinants among junior high school students remains limited.

Purpose: To identify the biopsychosocial determinants associated with mental-emotional disorders among adolescents.

Method: A cross-sectional design conducted from May to November 2025. A total of 101 students were selected using proportional stratified random sampling. Mental-emotional disorders were measured using the Strengths and Difficulties Questionnaire (SDQ). Independent variables included physical activity, sleep quality, academic burnout, smartphone addiction, peer support, bullying, parenting style, and sex. Data were analyzed using univariate and bivariate analyses with the chi-square test and prevalence ratio (PR) at a significance level of 0.05.

Results: The prevalence of mental-emotional disorders among students was 41.6%. Significant associations were found between mental-emotional disorders and low physical activity (PR=2.7; 95% CI: 1.750–4.393), poor sleep quality (PR=2.4; 95% CI: 1.483–3.974), high academic burnout (PR=2.5; 95% CI: 1.604–4.162), smartphone addiction (PR=1.9; 95% CI: 1.269–3.109), low peer support (PR=1.8; 95% CI: 1.150–3.032), and experiences of bullying (PR=13.7; 95% CI: 4.558–41.760). Sex and parenting style were not significantly associated with mental-emotional disorders.

Conclusion: Mental-emotional disorders among adolescents are significantly influenced by multiple biopsychosocial factors, particularly lifestyle behaviors, academic stress, peer relationships, and bullying experiences. School-based promotive and preventive interventions focusing on physical activity, sleep hygiene, stress management, strengthening peer support, and bullying prevention are strongly recommended.

Keyword: Academic Burnout; Adolescents; Biopsychosocial Factors; Bullying; Mental-Emotional Disorders.

INTRODUCTION

Adolescents constitute a large age group within the global population, reaching 1.28 billion individuals or 16% of the world's population. During this period, physical, cognitive, social, and emotional changes occur simultaneously, increasing vulnerability to psychological stress and the risk of emotional mental disorders (EMDs) (Abas, Boekoesoe, & Tarigan,

2023). EMDs can hinder adolescent development and lead to stigma, discrimination, academic disruption, and risky behaviors such as suicidal ideation; it is reported that 61% of adolescents with depression in Indonesia have considered suicide (Kamalah & Nafiah, 2023). Globally, the prevalence of mental health disorders reached 13% or 970 million

individuals in 2019, with anxiety disorders accounting for the largest proportion (31%). Among adolescents, the prevalence of mental disorders is estimated at 14%, with ADHD and conduct disorder commonly occurring in those aged 10–14 years, while anxiety disorders are more prevalent among older adolescents. In Indonesia, the prevalence of mental health problems among adolescents reaches 34.9%, with anxiety being the most frequently reported disorder (26.7%). In addition, 5.5% of adolescents aged 10–17 years experience mental health disorders, primarily anxiety (3.7%), depression (1%), PTSD (0.9%), and ADHD (0.5%) (Anggarjita, 2025).

The prevalence of EMDs in Indonesia has shown a fluctuating trend, from 11.6% (2007), decreasing to 6% (2013), increasing to 9.8% (2018), and declining to 2% in 2023. In Jambi Province, the prevalence increased from 1.6% (2013) to 3.6% (2018) and decreased to 0.9% in 2023. In Jambi City, the prevalence rose from 2.4% (2013) to 4.85% in 2018. These conditions indicate that despite the national decline, adolescent mental health issues remain locally relevant. According to George Engel's biopsychosocial theory, health status is influenced by the interaction of biological, psychological, and social factors. Various risk factors have been shown to be associated with emotional mental disorders, including bullying, low physical activity, poor sleep quality, smartphone addiction, academic burnout, lack of peer support, and authoritarian parenting styles. Bullying at the junior high school level in Indonesia reaches 32%, including where verbal bullying predominates (Syukri, 2020). Other factors such as low physical activity (50.8% in Jambi), sleep disturbances (62.9% of adolescents in Indonesia), smartphone addiction, and academic burnout have also been proven to be associated with EMDs (Muntomimah & Mubarak, 2025).

Previous studies have shown variations in the prevalence of EMDs across islands, ranging from 15.6% to 80.2% (Abas et al., 2023; Fishenola, 2024; Kholifah & Sodikin, 2020; Dondo et al., 2023; Prameswari, 2025; Wijoyo, Fadhillah, & Umara, 2023; Yunere, Anggraini, & Vitri, 2021). However, most studies have only examined one or two risk factors and have largely focused on university students or adolescents in major urban areas. Research that comprehensively examines biopsychosocial factors

among junior high school adolescents in Jambi City remains limited. This indicates a research gap that needs to be addressed. SMP Negeri 19 Jambi City is one of the schools with an A accreditation and a high proportion of academic stress; more than 70% of seventh-grade students experience moderate to very severe stress (Amanah, Tarigan, Kuswinarti 2023). A preliminary survey of 34 students showed that 17.6% experienced EMDs. These findings indicate that nearly one in five students has experienced symptoms of EMDs, highlighting the importance of conducting research to identify the biopsychosocial determinants of EMDs among junior high school adolescents in Jambi City (Amini, Prastia, & Pertiwi, 2020).

RESEARCH METHOD

A quantitative approach with a cross-sectional design, conducted at Junior High School 19 Jambi City from May to November 2025. A total of 101 out of 722 students were selected as the sample using a proportional stratified random sampling method. This study received ethical approval (Ethical Clearance) from the Ethics Committee of the Health Polytechnic of the Ministry of Health, Jambi, with reference number LB.02.06/2/1968/2025. The inclusion criteria included active students were enrolled in the odd semester of the 2025/2026 academic year, willing to participate as respondents, and smartphone users. The exclusion criteria included students who were absent during data collection and those undergoing psychological or psychiatric treatment or therapy at the time of the study. The independent variables in this study included physical activity, sleep quality, gender, academic burnout, smartphone addiction, peer support, bullying, and parenting style. Meanwhile, the dependent variable was emotional mental disorders.

Variable measurements were conducted using several standardized instruments. Physical activity was measured using the Physical Activity Questionnaire for Adolescents (PAQ-A), sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), academic burnout was measured using the Maslach Burnout Inventory Student Survey (MBI-SS), smartphone addiction was measured using the Smartphone Addiction Scale-Short Version (SAS-SV), peer support was assessed using the Perceived

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Social Support – Friends (PSS-Fr), bullying was measured using the Adolescent Peer Relations Instrument (APRI), and parenting style was assessed using the Parenting Styles & Dimensions Questionnaire (PSDQ). Data analysis consisted of univariate analysis to describe the frequency distribution of each variable descriptively, and bivariate analysis to examine the relationship between independent variables and emotional mental disorders using cross-tabulation and the chi-square test with a significance level of 0.05. Data analysis was performed using SPSS software. Since this study used a cross-sectional design, the measure of association applied was the Prevalence Ratio (PR),

with $PR < 1$ interpreted as a protective factor, $PR > 1$ as a risk factor, and $PR = 1$ indicating no association.

The dependent variable in this study is emotional mental disorders, defined as a psychological condition characterized by symptoms of anxiety and/or depression. This variable was measured using a standardized and validated questionnaire assessing emotional symptoms, with each item scored and summed to obtain a total score. The results were categorized into two groups: abnormal, if respondents exhibited symptoms of anxiety and/or depression with scores exceeding the established cut-off point, and normal, if respondents showed no symptoms or had scores below the cut-off. The data were analyzed using an ordinal scale based on these categories.

RESEARCH RESULTS

Table 1. Distribution of Respondents' Characteristics

Variable	Results	PR	95% CI	P-Value
Age (n%)(Mean±SD)(Range)(Year)	(13.3±0.8)(11-15)			
11	1/1.0			
12	15/14.9			
13	43/42.6			
14	32/31.7			
15	10/9.9			
Gender (n%)				
Female	52/51.5	1.3	0.860 – 2.232	0.245
Male	49/48.5			
Grade (n%)				
VII	30/29.7			
VIII	34/33.7			
IX	37/36.6			
Physical Activity (n%)				
Low	35/34.7	2.7	1.750 – 4.393	0.000
High	66/65.3			
Sleep Quality (n%)				
Poor	43/42.6	2.4	1.483 – 3.974	0.000
Good	58/57.4			
Academic Burnout (n%)				
High	39/38.4	2.5	1.604 – 4.162	0.000

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Low	62/61.4			
Smartphone Addiction (n/%)				
Addiction	58/57.4	1.9	1.269 – 3.109	0.003
Not Addiction	43/42.6			
Peer Support (n/%)				
Low	47/46.5	1.8	1.150 – 3.032	0.009
High	54/53.5			
Bullying (n/%)				
Ever	49/48.5	13.7	4.558 – 41.760	0.000
Never	52/51.5			
Parenting Style (n/%)				
Authoritarian	13/12.9	1.6	0.952 – 2.722	0.119
Permissive	20/19.8	1.0	0.565 – 1.937	0.887
Democratic	68/67.3	-	-	-
Emotional Disorders (n/%)				
Abnormal	42/41.6			
Normal	59/58.4			

The distribution of respondents' characteristics and the results of the bivariate analysis examining the association between independent variables and mental and emotional disorders. The mean age of respondents was 13.3 ± 0.8 years (range 11–15 years), with the majority aged 13 years (42.6%). Female respondents slightly outnumbered males (51.5% vs. 48.5%), although no significant association was found between gender and mental and emotional disorders (PR = 1.3; 95% CI: 0.860–2.232; $p = 0.245$). Most respondents were in grade IX (36.6%), followed by grade VIII (33.7%) and grade VII (29.7%). Significant associations were found between several variables and mental and emotional disorders, including low physical activity (PR = 2.7; 95% CI: 1.750–4.393; $p = 0.000$), poor sleep quality (PR = 2.4; 95% CI: 1.483–3.974; $p = 0.000$), high academic burnout (PR = 2.5; 95% CI: 1.604–4.162; $p = 0.000$), smartphone addiction (PR = 1.9; 95% CI: 1.269–3.109; $p = 0.003$), low peer support (PR = 1.8; 95% CI: 1.150–3.032; $p = 0.009$), and history of bullying (PR = 13.7; 95% CI: 4.558–41.760; $p = 0.000$). In contrast, parenting style, including authoritarian (PR = 1.6; 95% CI: 0.952–2.722; $p = 0.119$) and permissive (PR = 1.0; 95% CI: 0.565–1.937; $p = 0.887$), showed no significant association. Overall, 41.6% of respondents were categorized as having abnormal mental and emotional conditions, while 58.4% were classified as normal.

Table 2. Final Multivariate Analysis Model

Variable	B	p-value	PR (95% CI)
Sleep Quality	0.530	0.102	1.69 (0.900-3.205)
Bullying	2.515	0.000	12.36 (3.793 – 40.298)

The table shows bullying as the dominant factor causing emotional mental disorders (Adjusted PR = 12.36; 95% CI: 3.793–40.298; $p=0.000$). Respondents with a history of bullying had a 12.36-

fold higher risk of experiencing these disorders after controlling for sleep quality. The sleep quality variable itself was retained in the model despite not being significantly related (Adjusted PR = 1.69; $p=0.102$).

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DISCUSSION

Physical activity or exercise can improve mental health through the release of endorphins and serotonin, which play a role in enhancing mood, reducing stress, and alleviating symptoms of depression and anxiety, while also increasing blood flow to the brain to support cognitive clarity (Istyanto & Rahmi, 2023). The results of this study showed that the proportion of emotional mental disorders was higher among respondents with low physical activity (71.4%) compared to those with high physical activity (25.8%), and statistical analysis indicated a significant relationship between physical activity and emotional mental disorders. These findings are consistent with other studies (p-value = 0.001), (p-value = 0.0001), which concluded that there is a relationship between physical activity and mental health (Laksmi & Jayanti, 2023; Widodo, Hidayat, Pratama, & Pamungkas, 2025). However, they are not consistent with another study reporting no relationship (p-value = 0.133) (Bachtiar et al., 2023). Biologically, the benefits of physical activity for mental health are associated with increased endorphin levels as "natural mood enhancers," and the WHO recommends at least 150 minutes of physical activity per week as a preventive effort to maintain physical and mental health (Yea et al., 2024).

Sleep quality plays an important role in maintaining mental health, with a bidirectional relationship indicating that insufficient or poor-quality sleep is associated with increased stress, impaired cognitive function, and a higher risk of mental health disorders. Sleep patterns, particularly duration and quality, influence emotional health, where sleep problems such as difficulty initiating sleep, early awakening, and excessive daytime sleepiness are associated with symptoms of anxiety and depression in adolescents and young adults (Iqbal, Isnawati, & Hamim, 2025). The results showed that the proportion of emotional mental disorders was higher among adolescents with poor sleep quality (62.8%) compared to those with good sleep quality (25.9%), and statistical analysis indicated a significant relationship between sleep quality and emotional mental disorders (p-value = 0.000). These findings are consistent with other studies (p-value = 0.001), (p-value = 0.005), which concluded that sleep quality is associated with

emotional mental disorders. Biologically, sleep deprivation increases amygdala responsiveness to negative emotional stimuli and reduces prefrontal cortex activity, leading to emotional instability and stress (Dhamayanti, Faisal, & Maghfirah, 2019).

Gender differences may influence patterns of emotional regulation, as males and females have different ways of expressing and managing emotions, while age does not always correspond directly with emotional maturity. Emotional maturity is reflected in an individual's ability to control impulsive emotional expressions and channel them in socially acceptable ways. The results showed that the proportion of emotional mental disorders was higher among females (48.1%) compared to males (34.7%); however, statistical analysis indicated no significant relationship between gender and emotional mental disorders. Biologically and psychosocially, females experience hormonal fluctuations, a greater tendency for emotional expression, higher sensitivity to social pressures, and dual role demands, which may increase vulnerability to emotional disorders. Data showing a higher prevalence of emotional mental disorders in females (9.5%) compared to males (5.0%) (Sa'adah, Wardani, Aini, & Sari, 2024).

Academic burnout can occur due to monotonous learning activities and continuous academic pressure, resulting in decreased motivation, reduced interest in learning, suboptimal academic performance, and an increased risk of mental health problems. Burnout includes physical, mental, and emotional exhaustion, which can trigger depressive feelings in students (Supriyanto et al., 2022). The results showed that the proportion of emotional mental disorders was higher among respondents with high academic burnout (66.7%) compared to those with low burnout (25.8%), and statistical analysis indicated a significant relationship between academic burnout and emotional mental disorders (p-value = 0.000). These findings are consistent with a study by Marta et al. among university students (p-value = 0.001), which concluded that there is a relationship between academic burnout and emotional mental disorders (Butar, Perdana, & Ridwan, 2025). In addition, Ensora Health explains that burnout is closely related to mental health and is characterized by loss of motivation, increased feelings

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of failure, cynical attitudes, and decreased life satisfaction, which in the long term may increase the risk of mental health disorders (Engel, 2017).

Inappropriate smartphone use among adolescents can disrupt daily activities, interpersonal relationships, and overall health and well-being. During adolescence, interest in technology tends to be high, but it is not always accompanied by optimal use (Amalya, Tarigan, & Kuswinarti, 2019). Excessive online communication can reduce the quality of face-to-face interactions and is influenced by environmental factors such as parenting style and family functioning, as well as psychological factors such as anxiety, loneliness, low self-esteem, and addictive tendencies (Widodo et al., 2025). The results showed that the proportion of emotional mental disorders was higher among respondents with smartphone addiction (61.1%) compared to those without addiction (30.8%), and statistical analysis indicated a significant relationship between smartphone addiction and emotional mental disorders. These findings are consistent with previous research (p -value = 0.002) (Asif & Rahmadi, 2017). Smartphone dependence can lead to feelings of isolation, disruption of daily activities, decreased quality of social relationships, and an increased risk of emotional mental problems among adolescents (Haerani, Yoyoh, & Nurjannah, 2023).

Peer support is an important factor in adolescents' social and emotional development, as it provides opportunities to learn socialization, explore social roles, and receive emotional support in the form of empathy, care, and attention, which can enhance self-esteem and self-confidence. The results showed that the proportion of emotional mental disorders was higher among adolescents with low peer support (53.5%) compared to those with high support (29.6%), and statistical analysis indicated a significant relationship between peer support and emotional mental disorders. These findings are consistent with a study by Feleriska et al. (p -value = 0.048). Low peer support is associated with an increased risk of emotional mental disorders, while strong peer support serves as a protective factor for adolescents' emotional well-being (Yunere et al., 2021).

Bullying is an aggressive behavior carried out intentionally, whether physically, verbally, socially, or through online media, which has a significant impact on adolescents' emotional and psychological

conditions. Victims of bullying are at risk of experiencing prolonged sadness, depression, anxiety, low self-esteem, and difficulties in academic performance and social relationships. The results showed that the proportion of emotional mental disorders was higher among adolescents who had experienced bullying (79.6%) compared to those who had not (5.8%), and statistical analysis indicated a significant relationship between bullying and emotional mental disorders. These findings are consistent with other studies (p -value = 0.000), (p -value = 0.003) (Yulia, Rahma, Hasnah, & Alhamda, 2024). The impact of bullying in the school environment is reflected in decreased academic performance and attendance, impaired concentration, loss of interest in learning, and a tendency to withdraw from the social environment (Anggraini, Agustriyani, & Palupi, 2025). Questionnaire results showed that the most commonly experienced forms of bullying were social and verbal bullying, such as being ignored by peers, being made the subject of jokes, and being called by disliked names, all of which may increase the risk of emotional mental disorders among adolescents.

Parenting style is a continuous interaction process between parents and children that plays an important role in shaping trust, affection, and adolescents' mental and emotional development. Parents serve as the primary figures influencing adolescents' mental health through the parenting styles they apply (Ningrum, 2023). The results showed that the proportion of emotional mental disorders was higher among adolescents with authoritarian parenting (61.5%) compared to permissive (40.0%) and democratic parenting (38.2%); however, statistical analysis indicated no significant relationship between parenting style and emotional mental disorders. Conceptually, authoritarian and permissive parenting styles have the potential to trigger emotional disorders due to excessive pressure or lack of boundaries, whereas democratic parenting tends to have a more positive impact when applied consistently and in balance (Ishak, Rahma, & Salawali, 2025).

CONCLUSION

Emotional mental disorders in adolescents are influenced by biopsychosocial factors, particularly physical activity, sleep quality, academic burnout, smartphone addiction, peer support, and bullying

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experiences, which have been shown to have significant relationships. Adolescents with low physical activity, poor sleep quality, high academic burnout, smartphone addiction, low peer support, and bullying experiences have a higher risk of emotional mental disorders. In contrast, gender and parenting styles did not show significant relationships. These findings emphasize the importance of school-based promotive and preventive interventions that focus on healthy behaviors, academic stress management, social relationships, and bullying prevention. Future research is recommended to use a longitudinal design to examine causal relationships and evaluate the effectiveness of integrated interventions in preventing emotional mental disorders in adolescents.

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